Burroughs B 21

Desktop Business Micro–Computer Systems

Burroughs family of B 21 workstations is the entry level member of Burroughs B 20 Series of desktop micro-computers.

Configured around a 16-bit processor and the latest 5 1/4-inch mass storage technologies, the B 21 workstations are designed specifically for applications that require the power and flexibility of a mini-computer at a fraction of its costs.

Utilizing a distributed intelligence architecture, each B 21 workstation provides a high performance CPU, a high quality 15-inch video display unit, a programmable keyboard, and up to 1/2-million bytes of Random Access Memory (RAM).

Burroughs B 21 workstations can stand alone, or they can be connected together to form a local network *via* high-speed data link, sharing peripherals and data bases, but not the processor. The result is high responsiveness and the ability to support complex and diverse applications operating on the same data base simultaneously.

The B 21 workstation hardware and software architectures are totally modular, with several entry-level versions and multiple upgrade paths available.

The real-time, multi-tasking B 21 operating system is designed to be built upon. Four standard programming languages— COBOL, FORTRAN, BASIC, and Pascal—are supported. Data management facilities include ISAM, Forms, and Sort/Merge. Word processing is organized specifically for data processing integration. Communications protocols include Burroughs Poll/Select, Asychronous Terminal Emulator, IBM 3270 and 2780/3780, and X. 25.

Designed with sensitivity to the physiological and psychological needs of the operator, the B 21 workstation is a slender, elegant package that provides an ideal spatial relationship between eye, screen, keyboard, and the built-in document holder. The use of a lectern to house the workstation electronics and optional mass storage devices is another highly innovative feature.

The B 21 workstations are application compatible with Burroughs entire B 20 Series of workstations and are another significant example of Burroughs dedication to total compatibility.

Distributed intelligence has long been discussed as the ideal solution for applications of the '80s. Now, with Burroughs B 20 Series of desktop micro-computers, distributed intelligence is a low cost reality.

Highlights

☐ High performance, low cost desktop micro-computers.

☐ Each desktop unit consists of a 16-bit CPU, up to 1/2-million bytes of RAM, keyboard, video display unit, and optional mass storage.

☐ Desktop units can be linked together via a high-speed local network, providing multi-station access to shared resources such as data bases.

☐ Selectable mass storage devices ranging from low-cost mini-floppy units to high performance mini-Winchester units.

☐ High quality 15-inch display with multiple split screens and a wide range of display attributes.

☐ Real-time, multi-task operating system provides all the functionality needed for real-time and interactive applications.

☐ All programming languages—COBOL, FORTRAN, BASIC, and Pascal—meet industry standards.

☐ Data management facilities include ISAM, Sort/Merge, and Forms Facility.

☐ Powerful word processor designed specifically for data processing integration.

☐ Communications protocols include Burroughs Poll/Select, Asynchronous Terminal Emulator, IBM 3270 and 2780/3780, and X. 25.

☐ B 21 workstations can be connected to B 22 workstations in the same local network.

☐ Applications written on B 21 workstations can be executed on B 22 workstations.

System Overview

Each B 21 workstation consists of a 16-bit processor, RAM, keyboard, video display unit and optional mass storage devices, all integrated into a compact desktop unit.

The B 21 workstation can support up to 512K bytes of RAM, and has a display of 80 characters by 28 lines.

The 15-inch, high quality video display unit is mounted horizontally in "landscape" mode. The unit is fully articulated and may be tilted from 10 degrees to 30 degrees above the horizontal plane, and rotated ± 30 degrees for easy viewing. The display screen has an 18 MHz monitor, green phosphor to help reduce eyestrain, and an etched surface that eliminates glare. A brightness control can be easily accessed by the operator.

The workstation electronics and optional mass storage devices are housed in a lectern with document holders and LED indicator(s) for visual feedback of disk access.

The 98-key keyboard has a typewriter-style sculptured surface, contoured keycaps, and a palm rest for operator comfort. It is detachable and connected to the video display unit via a 5-foot coiled cable. The keyboard provides a 14-key numeric pad, an 8-key status/control function pad, a 6-key cursor control pad, a 4-key page control pad, and 10 user-definable function keys. The keyboard also provides software-controllable LED indicators on 8 keys.

Three kinds of mass storage devices are supported by the B 21 workstation:

☐ A 5 1/4-inch mini-floppy unit with a formatted capacity of 630K bytes.

☐ A 5 1/4-inch mini-Winchester unit with a formatted capacity of 5M bytes.

☐ A 5 1/4-inch mini-Winchester unit with a formatted capacity of 8.4M bytes.

Each B 21 workstation can support:

☐ Two mini-floppy units, or

☐ One mini-floppy and one mini-Winchester unit, or

☐ No mass storage.

Stand-alone and Cluster Systems

Burroughs B 21 family of desktop micro-computers is configured as follows:

☐ A B 21 workstation with mass storage devices is called a *stand-alone system*.

☐ A B 21 workstation with mass storage devices that can provide resources such as disk storage to other B 21 workstations is called a *master station*.

☐ A B 21 workstation that uses resources provided by a master station is called a *cluster station*.

☐ A high-speed local network connects B 21 cluster stations to the B 20 master station. A collection of B 20 cluster stations and a B 20 master station is called a *cluster system*.

A master station serves two functions: (1) running applications; and (2) providing resources to individual cluster stations.

The balance between the two functions depends on the kind of applications being run, the number of connected cluster stations, and the amount of memory in the master station.

The master station can run the same application programs as the cluster stations. The master station can also run server-only programs: ISAM, the Print Spooler, and the IBM 2780/3780 RJE and 3270 servers.

Typically, the master station serves both functions—running a standard application program plus a number of server functions.

The B 21 cluster systems range in size from two to four B 21 cluster stations. Any of the B 21 workstations can be used as a cluster station.

Clusters can also mix B 22 workstations with members of the B 21 family. Clusters in which the master station is a B 22 workstation can support up to 16 workstations.

NOTE: The B 21 system is capable of clustering up to four workstations. The application and/or amount of disk and memory at each workstation will dictate overall performance.

The B 21 Family

The B 21 family consists of four members:

☐ The B 21-1 supports from 256K to 512K bytes of RAM, and has no mass storage devices. It can be used only as a cluster station.

☐ The B 21-3 supports up to 512K bytes of RAM, and two mini-floppy units with a total formatted capacity of 1.26M bytes. It can be used as a cluster station with local mass storage.

☐ The B 21-4 supports from 256K to 512K bytes of RAM, one mini-floppy unit and one mini-Winchester unit with a total formatted capacity of 5.6M bytes. It can be used as a stand-alone system, or as a B 21 master station supporting B 21 cluster stations, or as a cluster station with local mass storage.

☐ The B 21-5 supports from 256K to 512K bytes of RAM, one mini-floppy unit and one mini-Winchester unit with a total formatted capacity of 9.0M bytes. It can be used as a stand-alone system, or as a B 21 master station supporting B 21 cluster stations, or as a cluster station with local mass storage.

	B 21-1	B 21-3	B 21-4	B 21-5
Maximum RAM	512KB	512KB	512KB	512KB
Display	80 x 28	80 x 28	80 x 28	80 x 28
Mass Storage	None	Two 5 1/4" Floppy Units (1.26MB Total)	One 5 1/4" Floppy Unit (630KB) One 5 1/4" Winchester (5M bytes)	One 5 1/4" Floppy Unit (630KB) One 5 1/4" Winchester (8.4M bytes)
Serial Communication	One RS-422	Two RS-232C One RS-422	Two RS-232C One RS-422	Two RS-232C One RS-422
Parallel Printer Port	None	One Centronics Interface	One Centronics Interface	One Centronics Interface
Uses	Cluster Station only	Cluster Station	Stand-alone System Master Station Cluster Station	Stand-alone System Master Station Cluster Station

Software

Burroughs software is structured for the system builder and provides the necessary components to speed application development:

☐ A real-time multi-task operating system.
☐ Four standard programming languages.
☐ Program development tools.
☐ Data management facilities.
☐ Text management facilities.
☐ Standard communications protocols.

The BTOS Operating System provides a reliable, high-performance foundation for real-time, interactive applications. It is efficient, easily extended, and highly configurable. Its modular structure, combined with its carefully planned model for extension, provides an adaptable environment that is ideal for implementing applications.

Burroughs B 20 programming languages are:

☐ COBOL—ANSI '74
   (high/intermediate level)
☐ FORTRAN—ANSI '77
☐ Pascal—ISO draft 5
☐ BASIC—ANSI '78

Each language implements its relevant standard, augmented by extensions aimed at enhancing its utility in its application area.

Productive program development requires good tools. Burroughs B 20 provides a complete, state-of-the-art environment. The B 20 Editor makes it easy to write and revise source code. The Linker/Librarian is used to maintain object libraries and to link together independently compiled modules. The Debugger is a powerful software debugging tool designed to help debug programs efficiently, including real-time programs.

Data management facilities are optimized for the B 20 system architecture. The multi-key ISAM provides flexible access to records with an option for record-level locking; its B-Tree implementation allows efficient retrieval by exact match, range match, or prefix match. The Forms facility makes it easy to design screen forms, display them on the screen, and accept operator-supplied data. The Sort/Merge facility sorts multiple files of unordered records and merges multiple files of ordered records into one ordered file.

Text management facilities are organized by the system builder. WRITEone is a state-of-the-art word processing package that includes a document assembly feature to allow merging of data processing and word processing capabilities.

Several industry standard communications packages are supported: Burroughs Poll/Select, IBM 3270 and 2780/3780 RJE Terminal Emulator, Asynchronous Terminal Emulator, and X. 25.

B 21 Workstation Electronics

The B 21 workstation electronics integrate a 16-bit processor, up to 512K bytes of RAM, I/O, and video control logic into one single PC (printed circuit) board. A second PC board contains the mini-floppy and mini-Winchester controller electronics, two RS-232C communications channels, and a Centronics-compatible printer interface.

These printed circuit assemblies are mounted vertically in a cardcage. A motherboard connects the logic assemblies to the I/O panel at the rear of the desktop enclosure, and to a power supply.

The B 21 processor board contains a 16-bit processor and provides the following system functions:

☐ Memory control and refresh logic.
☐ External interrupt control logic.
☐ RAM parity check and generate logic.
☐ Direct Memory Access (DMA) control.
☐ Bootstrap (ROM) software and logic.
☐ Video control logic.
☐ Expansion interface.

The B 21 workstation RAM is based on 64K-bit RAM chips, organized in 8 banks of 9 chips each. Memory sizes range from 128K to 512K bytes. RAM validation is through a single-bit-per-byte error-detection parity unit.

A 4K byte ROM is provided on the B 21 processor board for system bootstrapping and cluster communication line initialization. In addition, the bootstrap ROM contains diagnostics that are executed as part of the system power-on procedures or whenever the system reset button is pressed.

The DMA control logic is based on a multi-channel DMA control chip. Three DMA channels are provided: high-speed cluster communications, video display refresh, and Winchester/floppy disk.

The video display control logic is provided by a CRT controller. The 80-column display is refreshed directly from system memory. Character generation is performed *via* a font ROM that contains 256 displayable characters.

Cluster communications are controlled by a communications controller. The high-speed local network is implemented *via* a multi-drop RS-422 line running at 307K baud.

The two RS-232C communications channels on the optional Winchester/floppy controller board may be programmed to perform a variety of tasks, with software-selectable baud rates ranging from 110 to 9.6K baud. The RS-422 channel operates up to 410K baud. All three channels may support a variety of synchronous and asynchronous bit- and byte-oriented protocols, including Burroughs Poll/Select, BiSync, ADCCP, SDLC, and HDLC.

Video Display Subsystems

The B 21 workstation display is organized as 80 characters by 28 lines. The screen may be split into multiple parts, called "frames." The number of frames, and their layout on the display, is established by the user with calls to the BTOS Operating System. Scrolling may be performed in each frame independent of other frames.

Each character in the B 21 workstation display is built in a 9 x 11 pixel cell. Various display attributes as shown below may be added to each character individually, or to the entire display.

Standard Attributes

Screen—Reverse Video and Cursor Position.

Character—Half Bright, Underline, Reverse Video, and Blinking.

System Specifications

Memory Capacity
Maximum RAM: 512K bytes
Maximum ROM: 4K bytes

Mass Storage

☐ 5 1/4-inch Winchester disk drive for B 21-4
Unformatted: 6.4M bytes
Formatted: 5M bytes
☐ 5 1/4-inch floppy disk drive for B 21-3, B 21-4, and B 21-5
Unformatted: 1.0M bytes
Formatted: 631K bytes
☐ 5 1/4-inch Winchester disk drive for B 21-5
Unformatted: 10.7M bytes
Formatted: 8.4 bytes

B21-6T

A. Highlights

- The B21-6T incorporates a 16 bit 8086 INTEL Processor with an 8MH, clock speed.

- Minimum RAM memory of 256KB expandable to a maximum of 512KB in 128KB increments.

- Display has 28 lines by 80 (9 x 11 Pixel) characters per line.

- Mass storage is comprised of one (1) Dual-sided, Double Density 5¼" mini disk with 1.0MB Unformatted Capacity PLUS one (1) 5¼" Winchester with 15MB Unformatted Capacity. 15MB 5¼" Winchester disk places the B20 on the leading edge of technology.

- Data communications available through two (2) RS-232C channels that have software selectable baud rates ranging from 110 to 19.2K baud and one (1) RS-422 channel that can operate up to 410K baud and is used to link B20 systems together in a Cluster environment. The RS-232C channels may be used to attach a Letter Quality Printer, e.g. AP 1300-20, and/or for external data communications.

- Offers one (1) Centronics compatible 8-bit parallel printer port.

B. Marketing Strategy

- Can be used as a "CLUSTER STATION" where there is a requirement for local disk or local printer.

The table below summarizes the characteristics of the B21 Systems.

THE B21 FAMILY

	B21-1	B21-1T	B21-2T	B21-3T	B21-4T	B21-5T	B21-6T
Processor	16 Bit 8088	16 Bit 8086	16 Bit 8086	16 Bit 8086	16 Bit 8086	16 Bit 8086	16 Bit 8086
Speed	5MHZ	8MHZ	8MHZ	8MHZ	8MHZ	8MHZ	8MHZ
Maximum RAM Memory	512	512	512	512	512	512	512
Display Size	28 x 80	28 x 80	28 x 80	28 x 80	28 x 80	28 x 80	28 x 80
Mass Storage	NONE	NONE	(1) 5¼" Mini Disk (1.0MB Unformatted; 630KB Format ted)	(2) 5¼" Mini Disk (2.0MB Total Unformatted; 1.26MB Total Formatted)	(1) 5¼" Mini Disk (1.0MB Unformatted; 630KB Format ted) (1) 5¼" Winchester (6.4MB Unformatted; 5.0MB Formatted)	(1) 5¼" Mini Disk (1.0MB Unformatted; 630KB Format ted) (1) 5¼" Winchester (10.7MB Unformatted; 8.4MB Format ted)	(1) 5¼" Mini Disk (1.0MB Unformatted; 630KB Format ted) (1) 5¼" Winchester (15MB Unformatted; 12.6MB For matted)
Serial Communication	(1) RS-422		(2) RS-232C (1) RS-422	(2) RS-232C (1) RS-422	(2) RS-232C (1) RS-422	(2) RS-232C (1) RS-422	(2) RS-232C (1) RS-422
Parallel Printer Port	NONE		(1) Centronics Interface	(1) Centronics Interface	(1) Centronics Interface	(1) Centronics Interface	(1) Centronics Interface
Use	"CLUSTER STATION" ONLY		"CLUSTER STATION" ONLY	"CLUSTER STATION" MAY BE A "STAND-ALONE" SYSTEM	"CLUSTER" OR "STAND-ALONE" OR "MASTER" SYSTEM	"CLUSTER" OR "STAND-ALONE" OR "MASTER" SYSTEM	"CLUSTER" OR "STAND-ALONE" OR "MASTER" SYSTEM

NOTE: B21 HARDWARE CANNOT BE UPGRADED TO BECOME B22 HARDWARE.

B21-4T, B21-5T, B21-6T systems used as "MASTER STATION" require a MINIMUM of 384KB RAM memory.

12